ATCOM® GSM Card AX-4G

Product Guide

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Content

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Contact ATCOM

The Introduction of ATCOM

Founded in 1998, ATCOM technology has been always endeavoring in the R&D and manufacturing of the internet communication terminals. The product line of ATCOM includes IP Phone, USB Phone, IP PBX, VoIP gateway and Asterisk Card.

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Chapter 1 the Introduction of AX-4G

Overview of the AX-4G

AX-4G Asterisk card is the GSM channel PCI card that supports up to four GSM channels.

Using AX-4G GSM card, open source Asterisk PBX and stand alone PC, users can create their SOHO telephony solution which includes all the sophisticated features of traditional PBX, and extended features in IP PBX, such as voicemail, call transfer, call park, call pick up, call forward, bulk SMS sending, SMS receiving and so on. Using AX4G, service operator can deploy GSM service operation.

Features

4 GSM quadband channels(850/900/1800/1900MHz)
1 SIM card per GSM channel
DTMF detection
Bulk SMS sending
SMS receiving and storage
Multi-language for SMS content
IMEI changeable
PIN-Number unlock for the SIM card
Monitor GSM signal strength by command and LEDs
Monitor communication status by command line
Send SMS by Asterisk CLI, and dial-plan
Detect accurately when the called party answers the call
Suitable for 3.3 volts and 5.0 volts 32 bit PCI slots
PCI slot or 4-pin connector power feeding

Applications

GSM connectivity for PBX
Mobile PBX
GSM VoIP gateway
SMS gateway
GSM callback services
GSM service operation
Billing system

Hardware Requirement

500-Mhz Pentium III
64MB RAM
3.3V or 5V PCI 2.2 slot

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Measurement and Weight

Inner box	221 * 142 * 62mm
G.W./unit	0.25kg
Card Size	196mm *115 mm

Package

Item	Quantity
AX-4G mother board	1
GSM module (GX01)	1-4

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Chapter 2 Hardware Introduction
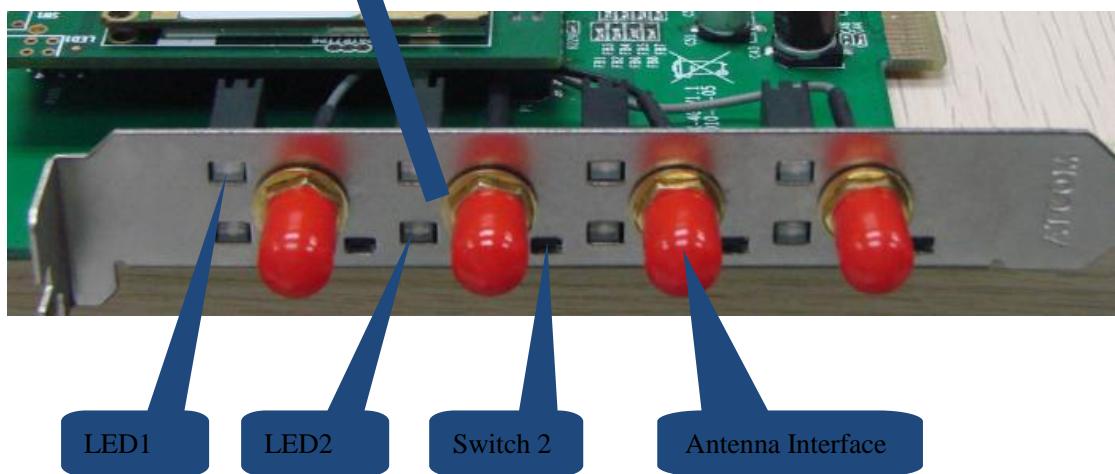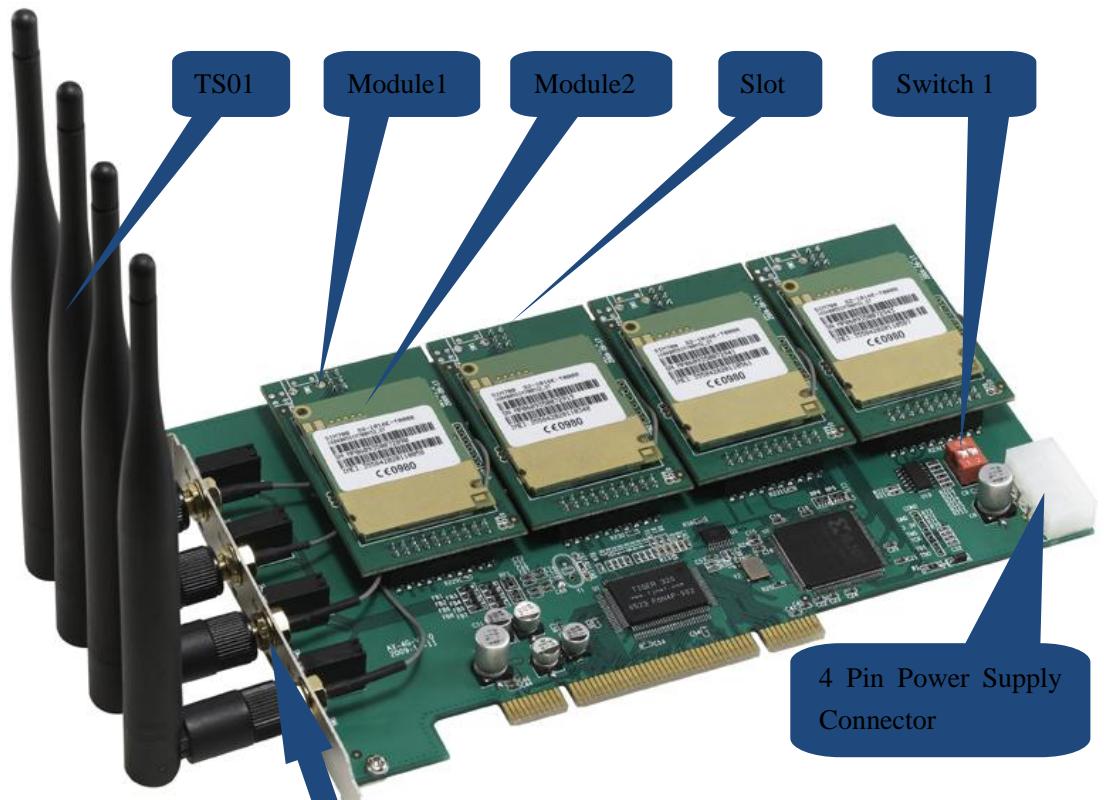
TS01: Omnidirectional antenna

GX01: Module1+Module2

Module1: Module1 is used to load Module2, and one Module1 supports one cell phone card slot.

Module2: GSM/GPRS/EDGE 850/900/1800/1900MHz wireless module

Slot: SIM card of cell phone slot

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Switch 1: There are two ways to provide power feeding for AX-4G, customers can use PCI slot to give power feeding directly, in this situation, please turn the switch1 to 1 on and 2 off; customer can also give power feeding through 4 pin power connector, and in this situation, please turn the swith1 to 1 off and 2 on.

4 Pin Power Supply: 4 pin power supply connector.

LED1: When the channel is in communication status, LED1 will be green steady.

LED2: Network status indicator of SIM card. When the SIM card is searching network, the LED2 will blink fast; when the SIM card has found the GSM network and registered successfully, the LED2 will flip at lower frequency.

Switch 2: Customer can turn off or turn on the SIM card manually through switch 2.

Antenna Interface: An interface used to connect with antenna.

Attention: In order to enhance the GSM signal in some hard environment, except the Antenna in the illustration above, ATCOM can also provide one other type of antenna(TL01) which has long cable(about one meter long) and can be connected to outside.

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Chapter 3 Software Installation

Test Environment:

dahdi-linux-2.3.0.4 (download from ATCOM website)
dahdi-tools-2.3.0.4
asterisk-1.6.2.6.4 (download from ATCOM website)
centos 5.6 (kernel version: 2.6.18-238.el5)
AX-4G+4*GX01

After inserting the card into your PCI slot and boot your server, please use the "lspci" command to check the PCI bus compatibility. From the correct output, you can see the following line:

01:01.0 Communication controller: Tiger Jet Network Inc. Tiger3XX Modem/ISDN interface

----
A Tiger Jet device will be found, if you can not see the **Tiger Jet** device, please poweroff your server and try another PCI slot, if it still does not help, you have to check the compatibility issue between the card and your PCI bus.

1. To install asterisk and dahdi, we have to use "yum" command to install the following prerequisite packages:
    bison bison-devel zlib zlib-devel openssl openssl-devel gnutls-devel gcc gcc-c++

2. Download dahdi-linux, dahdi-tools, and asterisk
    Attention: please download dahdi-linux and asterisk from ATCOM website, because ATCOM has modified the source code for AX-4G.
    [root@localhost src]#
    wget
    http://chinavoipsupply.com:8080/downloads/TelephonyCard/drivers/AX2G4A_AX4G/asterisk-1.6.2.6.4.tar.gz

    [root@localhost src]#
    wget
    http://chinavoipsupply.com:8080/downloads/TelephonyCard/drivers/AX2G4A_AX4G/dahdi-linux-2.3.0.4.tar.gz

    [root@localhost src]#
    wget
    http://chinavoipsupply.com:8080/downloads/TelephonyCard/drivers/AX2G4A_AX4G/dahdi-tools-2.3.0.4.tar.gz

3. Install dahdi-linux and dahdi-tools
    Install dahdi-linux

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1) [root@localhost src]# tar -xvzf dahdi-linux-2.3.1.tar.gz
2) [root@localhost dahdi-linux-2.3.0]# make
3) [root@localhost dahdi-linux-2.3.0]# make install

Install dahdi-tools
1) [root@localhost src]# tar -xvzf dahdi-tools-2.3.0.tar.gz
2) [root@localhost dahdi-tools-2.3.0]# ./configure
3) [root@localhost dahdi-tools-2.3.0]# make
4) [root@localhost dahdi-tools-2.3.0]# make install
5) [root@localhost dahdi-tools-2.3.0]# make config

4. Install asterisk
1) [root@localhost src]# tar -xvzf asterisk-1.6.2.6.1.tar.gz
2) [root@localhost asterisk-1.6.2.6]# ./configure
3) [root@localhost asterisk-1.6.2.6]# make
4) [root@localhost asterisk-1.6.2.6]# make install
5) [root@localhost asterisk-1.6.2.6]# make samples

Chapter 4 Software Configuration

1. Please check if the AX-4G driver has been loaded successfully, run cat /proc/interrupts command and you should see one line with ax4g:

    20:      2310670   2218516   IO-APIC-fasteoi   ax4g/ax2g4a

    If you can not see ax4g, you can try to poweroff your server and replug AX-4G into another PCI slot.

2. Please run the "dahdi_genconf" command to configure the /etc/dahdi/system.conf file and generate /etc/asterisk/dahdi-channels.conf file.

    [root@localhost ~]# dahdi_genconf

    It does not show any output if dahdi_genconf run successfully.

    After running dahdi_genconf successfully, the system.conf file will get the following configuration:

/etc/dahdi/system.conf:

```
# Autogenerated by /usr/sbin/dahdi_genconf on Thu Jul   1 11:33:13 2010
# If you edit this file and execute /usr/sbin/dahdi_genconf again,
# your manual changes will be LOST.
# Dahdi Configuration File
# This file is parsed by the Dahdi Configurator, dahdi_cfg
# Span 1: WCTDM/4 "ATCOM AX4G Board 5" (MASTER)
fxsks=1
echocanceller=mg2,1
fxsks=2
echocanceller=mg2,2
fxsks=3
echocanceller=mg2,3
fxsks=4
echocanceller=mg2,4


# Global data
loadzone          = us
defaultzone       = us
```

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After running dahdi_genconf successfully, the dahdi-channels.conf file will get the following configuration:

```
; Span 1: WCTDM/4 "ATCOM AX4G Board 5" (MASTER)
;;;; line="1 WCTDM/4/0 FXSKS    (SWEC: MG2)"
signalling=fxs_ks
callerid=asreceived
group=0
context=from-pstn
channel => 1
callerid=
group=
context=default

;;;; line="2 WCTDM/4/1 FXSKS    (SWEC: MG2)"
signalling=fxs_ks
callerid=asreceived
group=0
context=from-pstn
channel => 2
callerid=
group=
context=default

;;;; line="3 WCTDM/4/2 FXSKS    (SWEC: MG2)"
signalling=fxs_ks
callerid=asreceived
group=0
context=from-pstn
channel => 3
callerid=
group=
context=default
;;;; line="4 WCTDM/4/3 FXSKS    (SWEC: MG2)"
signalling=fxs_ks
callerid=asreceived
group=0
context=from-pstn
channel => 4
callerid=
group=
context=default
```

3.   Please run dahdi_cfg –vv command.

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4. Please add the following line at the bottom of the chan_dahdi.conf file:
    #include dahdi-channels.conf

5. Please run asterisk with the following command:
    asterisk –vvgc
    reload

6. Please run dahdi show channels command
    You should see 4 channels as the following:
    *CLI> dahdi show channels

Chan Extension	Context	Language	MOH Interpret	Blocked	State
pseudo	default		default		In Service
1	from-pstn		default		In Service
2	from-pstn		default		In Service
3	from-pstn		default		In Service
4	from-pstn		default		In Service

*CLI>

Chapter 5 Test

1. Please check the status of the cell phone card plugged in the ax4g.
   Please type the following command three times, the result of the third time is correct:
   cat /proc/dahdi/ax4g_sta_card_1
   You can get one line with the following information:
   S0:4, S1:4, S2:4, S3:2
   The S0, S1, S2, S3 stand for the four modules on the ax4g orderly, and different numbers behind colon stand for different status of cell phone card.
   a: it means that the cell phone card is sending SMS.
   1: it means that the module2 is powered off.
   2: it means that the cell phone card is still searching for GSM network.
   3: it means that the cell phone card has registered successfully before, but now it failed.
   4: it means that the cell phone card has found GSM network successfully, and it is in idle status (not used by calling or sending SMS).
   5: it means that after a communication, one side hangs up the phone, but the other side has not hang up.
   6: it means that the cell phone card is dialing-out.
   7: it means that somebody from outside is calling the channel, but no extension answers the phone, the extension is ringing.
   8: it means that an extension answers an incoming call, but the communication has not yet established, at this moment, the called party hangs up, then the caller do not need to be paid for this call, because this call has not been established really.
   9: it means that the channel is in communication status, and the call has been established really.

2. Please check the network signal of the cell phone card plugged in the ax4g, type the following command three times, the result of the third time is correct:
   cat /proc/dahdi/GSM_signal_card_1
   you can get one line with the following information:
   SQ0 = 31, SQ1 = 30, SQ2 = 18, SQ3 = 28
   The SQ0, SQ1, SQ2, SQ3 stand for the four modules on the ax4g orderly, and different numbers behind equality sign stand for the network signal of the cell phone card, the numbers 0 and 99 mean no signal, for other numbers, the bigger the number is, the stronger the signal is.

3. Check when the called party answers the call, when you dial-out through AX-4G.
   Please use **dmesg** command to detect if the called party answers the call when you dail-out through AX-4G, if the called party has answered the call, after running **dmesg** command, you can get one line with GX PR, X stands for the channel number. This feature will help customer to do billing accurately.

4. Use the **dmesg** command to check your GX01 version:

```
[root@localhost ~]# dmesg
wctdm_init_GSM CARD:0
VoiceGSM System:0a
Module 0: Installed -- AUTO GSM(version 0x46)
wctdm_init_GSM CARD:1
VoiceGSM System:0a
Module 1: Installed -- AUTO GSM(version 0x46)
wctdm_init_GSM CARD:2
VoiceGSM System:0a
Module 2: Installed -- AUTO GSM(version 0x46)
wctdm_init_GSM CARD:3
VoiceGSM System:0a
Module 3: Installed -- AUTO GSM(version 0x46)
```

Notice:only the GX01 0x46 and above version support bulk SMS sending, multi-language for SMS content, PIN number unlock.

5. Input PIN-Number for the SIM card in /etc/asterisk/dahdi-channels.conf file, add the following red line：

```
;;; line="2 WCTDM/6/1 FXSKS    (In use) (SWEC: MG2)"
pinnum=1234
signalling=fxs_ks
callerid=asreceived
group=0
context=from-pstn
channel => 2
```

After setting, please restart asterisk to make the setting effective.

6. Please use the following command to read your IMEI number of GX01:

```
[root@localhost ~]# cat /proc/dahdi/imei_read_1
IMEI0: 355842020258444, IMEI1: 355842020187437, IMEI2: 355842020110041, IMEI3: 355842020257974
```

7. Please start asterisk, then use the following command to change IMEI, 1 stands for the channel number, and 355842020257974 stands for the IMEI number which you want to use.

```
localhost*CLI> gsm set imei 1 355842020257974
gsm set imei cardnum=1 value=355842020257974
gsm set imei ok
```

Edit a dial-plan, and use AX-4G to make outgoing calls and get incoming calls.

8. Please edit a dial-plan in extensions.conf file, you can refer to the following dial-plan:

```
[from-internal]
exten=>_1.,1,Dial(dahdi/1/${EXTEN:1})
```

```
exten=>_1.,2,Hangup()
exten=>_2.,1,Dial(dahdi/2/${EXTEN:1})
exten=>_2.,2,Hangup()
exten=>_3.,1,Dial(dahdi/3/${EXTEN:1})
exten=>_3.,2,Hangup()
exten=>_4.,1,Dial(dahdi/4/${EXTEN:1})
exten=>_4.,2,Hangup()

 [from-pstn]
exten=>s,1,Answer()
exten=>s,2,Dial(sip/500)
exten=>s,3,hangup()
```

9. Use a registered sip phone to make an outgoing call, according to the dial-plan above, if you want to make the outgoing call through the first channel, you have to add a prefix "1" when you dial out, if you want to make the outgoing call through the second channel, you have to add a prefix "2". Here, the destination number is 15128731752, so dialing 115128731752, then you can get the following output from asterisk CLI:

```
 *CLI>     == Using SIP RTP CoS mark 5
   --Executing [115128731752@from-internal:1] Dial("SIP/500-00000003",
      "dahdi/1/15128731752") in new stack
      -- Called 1/15128731752
      -- DAHDI/1-1 answered SIP/500-00000003
```

 The called party rings, and pick up the phone, so the call is successful.

10. Please use a phone to make an incoming call, here, the SIM card number for the first channel is 15889587467, using a cell phone to dial 15889587467, the sip 500 rings, and you can get the following output from asterisk CLI:

```
*CLI>        -- Starting simple switch on 'DAHDI/1-1'
[Jul   1 11:42:53] NOTICE[20678]: chan_dahdi.c:8734 ss_thread: Got event 18 (Ring Begin)...
      -- Executing [s@from-pstn:1] Answer("DAHDI/1-1", "") in new stack
      -- Executing [s@from-pstn:2] Dial("DAHDI/1-1", "sip/500") in new stack
   == Using SIP RTP CoS mark 5
      -- Called 500
      -- SIP/500-00000004 is ringing
      -- SIP/500-00000004 answered DAHDI/1-1
```

Customer can test other three channels in the same way.

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Chapter 6 Sending and Receiving SMS

There are three ways for users to send SMS by ATCOM AX4G.

1. Sending SMS by asterisk CLI command directly.

   Before sending SMS, customer should register a sip phone. 600 is a sip user, 13728737752 is a destination phone number, the following example sends a message from sip 600 to 13728737752 using the first channel:

   localhost*CLI> sendsms sip/600 dahdi/1 13728737752 Welcome to ATCOM

   == Using SIP RTP CoS mark 5
       -- Launching   Sendsms(dahdi/1,13728737752,Welcome   to   ATCOM)   on
   SIP/600-0000002c
       -- Launching DoSms(13728737752 Welcome to ATCOM) on DAHDI/1-1
   [Apr 25 14:32:32] WARNING[22660]: chan_dahdi.c:5827 dahdi_handle_event: gsm send sms sucess
   -- Hungup 'DAHDI/1-1'

2. Sending bulk SMS

Before sending the SMS, please start Asterisk.

In /var/spool/asterisk directory, please edit a xml file like the following format, then copy the content to outgoing file, after that the SMS will be send out.

bulksms.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<sms>
    <receiver>15012871900</receiver>
    <receiver>13728731755</receiver>

    <channel>1</channel>

    <content>
    hello! welcom to ATCOM!
    </content>
</sms>
```

Please copy the bulksms.xml content to outgoing file, run the command: **cp bulksms.xml outgoing/**

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From asterisk CLI, you can get the following output, if you can see the red characters result=1, it means that the SMS has been sent out successfully; If you get result=-1, it means that the SMS fails to send out.

localhost*CLI>

[Sep 9 16:08:23] NOTICE[3593]: pbx_spool.c:166 apply_sms_outgoing: pbx_spool find called name=15012871900

[Sep 9 16:08:23] NOTICE[3593]: pbx_spool.c:166 apply_sms_outgoing: pbx_spool find called name=13728731752

      --   Attempting   call   on   sms/   for   application queuesms(dahdi/1,15012871900&13728731755,hello! welcom to ATCOM!) (Retry 1)

    -- Launching queuesms(dahdi/1,15012871900&13728731752,hello! welcom to ATCOM!) on type/data-00000001

[Sep 9 16:08:23] NOTICE[3823]: pbx_spool.c:531 attempt_thread: Call completed to sms/

    -- Launching DoSms(15012871900&13728731752 hello! welcom to ATCOM!) on DAHDI/1-1

[Sep 9 16:08:27] NOTICE[3825]: chan_dahdi.c:18205 sms_queue_send: sessionid=1315555703.3 channum=1 time=2011/09/09 16:08:27 send to called=15012871900 result=1

[Sep 9 16:08:31] NOTICE[3825]: chan_dahdi.c:18205 sms_queue_send: sessionid=1315555703.3 channum=1 time=2011/09/09 16:08:31 send to called=13728731755 result=1

    -- Hungup 'DAHDI/1-1'

User can also check if the SMS is sent successfully or not by checking the /var/log/asterisk/sms/sendsms directory, the system will generate one log file each day for writing down if the SMS is sent successfully or not, for example, sendsms_2011-12-02.log is generated on Dec 02th, 2011, which writes down all the sent SMS results on Dec 02th, 2011.

The Format of the xml file

Xml file name: customer can name whatever name you want.

Receiver: add the destination phone number, one line for one destination phone number, the example above add two destination phone numbers.

Channel: choose the GSM channel by which the system send the SMS out.

Content: input or paste the SMS content that you need to send out.

3. Receiving SMS

When the AX4G gets a SMS, it will pop up the information like the following in asterisk CLI

localhost*CLI>

chan_dahdi.c: handle_init_event: gsm recv new sms   from +8613728737752

When one SMS is received, the system will generate a file for storing the SMS, and the file is under /var/log/asterisk/sms/recvsms directory.

The format of the file name: recvsms_channel number_time_+cell phone number.log

The format of SMS content: channno:channel >>date time|+cell phone number| SMS content.

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Chapter 7 Reference

http://www.asteriskguru.com/

http://www.asterisk.org/downloads

http://www.openippbx.org/index.php?title=Main_Page

http://www.atcom.cn/

http://ArtTel.ru